

# **FACT SHEET FOR NPDES PERMIT NO. WA0021202**

## **PORT LUDLOW**

### **A Master Planned Resort**

### **Owned and Operated by**

### **Olympic Water & Sewer, Inc.**

#### **SUMMARY**

The Port Ludlow sewage treatment plant is owned and operated by Olympic Water and Sewer, Inc. a subsidiary of Pope Resources L.P. The treatment plant was upgraded and expanded in 1989 to secondary activated sludge. A comprehensive sewer plan was submitted in 1990. New pumping lift stations were built. The last permit was issued in 1989, expired in 1994 and was administratively extended to June 30, 1999. An application for renewing the NPDES permit was received on February 19, 1999. Despite not having a current permit this facility has been a recipient of the Department of Ecology's compliance star award for its good job running the plant and submitting the required data in a timely manner.

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## INTRODUCTION

The Federal Clean Water Act (FCWA, 1972, and later modifications, 1977, 1981, and 1987) established water quality goals for the navigable (surface) waters of the United States. One of the mechanisms for achieving the goals of the Clean Water Act is the National Pollutant Discharge Elimination System of permits (NPDES permits), which is administered by the Environmental Protection Agency (EPA). The EPA has delegated responsibility to administer the NPDES permit program to the State of Washington on the basis of Chapter 90.48 RCW which defines the Department of Ecology's authority and obligations in administering the wastewater discharge permit program.

The regulations adopted by the State include procedures for issuing permits (Chapter 173-220 WAC), technical criteria for discharges from municipal wastewater treatment facilities (Chapter 173-221 WAC), water quality criteria for surface and ground waters (Chapters 173-201A and 200 WAC), and sediment management standards (Chapter 173-204 WAC). These regulations require that a permit be issued before discharge of wastewater to waters of the state is allowed. The regulations also establish the basis for effluent limitations and other requirements which are to be included in the permit. One of the requirements (WAC 173-220-060) for issuing a permit under the NPDES permit program is the preparation of a draft permit and an accompanying fact sheet. Public notice of the availability of the draft permit is required at least thirty days before the permit is issued (WAC 173-220-050). The fact sheet and draft permit are available for review (see Appendix A--Public Involvement of the fact sheet for more detail on the Public Notice procedures).

The fact sheet and draft permit have been reviewed by the Permittee. Errors and omissions identified in this review have been corrected before going to public notice. After the public comment period has closed, the Department will summarize the substantive comments and the response to each comment. The summary and response to comments will become part of the file on the permit and parties submitting comments will receive a copy of the Department's response. The fact sheet will not be revised. Comments and the resultant changes to the permit will be summarized in Appendix D--Response to Comments.

GENERAL INFORMATION	
Applicant	Olympic Water and Sewer, Inc. (A Pope Resources Company)
Facility Name and Address	Port Ludlow Wastewater Treatment Plant 8481 Oak Bay Road, Port Ludlow, WA 98365 (facility)
Type of Treatment	Domestic, Secondary, Activated Sludge
Discharge Location	Outer Port Ludlow Bay Latitude: 47° 56' 11" N      Longitude: 122° 40' 27" W.
Water Body ID Number	WA-PS-0130, segment 25-01-00, and 390KRD

## **BACKGROUND INFORMATION**

### *DESCRIPTION OF THE FACILITY*

#### **HISTORY**

Port Ludlow is a residential and recreational development located on the Olympic Peninsula in eastern Jefferson County, Washington. The community is served by a secondary wastewater treatment plant that was constructed in 1969 to treat an average daily design flow of 60,000 gallons per day (gpd). Wastewater flows in 1984 averaged nearly 125,000 gpd, well in excess of the design capacity.

Pope Resources began planning and upgrading the wastewater treatment plant in 1980. Most of the plant upgrades were completed in 1989 with the exception of some lift pump station upgrades and the addition of an additional third aeration basin. Some of the lift stations have been installed, the third aeration basin has not. From 1989 to 1998 there has been an annual report of water quality in Port Ludlow Bay. Because no impacts were seen as a result of the discharge, Ecology allowed the Permittee to stop conducting and submitting the study. With rare exception the water quality of the receiving water met Class AA standards for the parameters tested. The Permittee has also annually submitted a videotape and report of the outfall pipe and diffuser. This activity was also allowed to be discontinued on an annual basis.

The permit issued in 1989 had interim limits for an average flow not to exceed 0.32 mgd and final limits of 0.64 mgd as well as interim and final limits for BOD and TSS based on the addition of a third aeration basin. The third aeration basin has not been added and the average flows have not exceeded the limit of 0.32 mgd.

#### **COLLECTION SYSTEM STATUS**

In the mid-1980s it was noted that the collection system had a severe inflow and infiltration (I/I) problem. A program was initiated and the I/I problem has been greatly reduced.

A final comprehensive sewer plan was issued in July 1990 and recommended upgrading lift station number three to increase pumping capacity and standby power generation. Lift station number two was recommended to get a new bypass interceptor and lift station number one was recommended to be moved and increase the size of the force mains. A third aeration basin at the wastewater treatment plant was recommended with variable frequency drives to be installed on the influent pump station. The third aeration basin is due to be constructed in the summer of 2001.

#### **TREATMENT PROCESSES**

The wastewater treatment plant has a current treatment capacity of 0.32 mgd (maximum month flow). The Permittees have planned to expand the plant to boost capacity to 0.64 mgd since 1989, but this has not occurred. The plant is an activated sludge system with two 26-foot diameter aeration tanks and two 32-foot diameter clarification tanks. Sludge is returned to a 28-foot diameter digester for thickening. The effluent is chlorinated in a basin for a minimum of 38 minutes before being discharged to an outfall.

There does not appear to be any industrial or commercial users discharging to the treatment works.

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The plant is classified as Class I, discharging less than 1.0 MGD. There are four certified operators available to staff the plant. Two operators have a Group III operators certification, one has a Group II certification and one has a Group I certification. In addition, two other personnel are working towards certification and are available to assist in daily operations. The plant has employees present Monday through Friday from 7:00 A.M. to 4:30 P.M. and on the weekend from 7:00 A.M. to 1:00 P.M.

**DISCHARGE OUTFALL**

The discharge outfall is located at a depth of approximately 55 feet below mean sea level in outer Port Ludlow Bay. The outfall pipe is approximately 3300 feet long. However, because the pipe travels in a northerly and shallow angle to the shore, the end of the pipe is approximately 1600 feet east from the shore. The latitude and longitude location for the discharge as given in the 1989 permit was incorrect, presumably because some figures were swapped. An examination of the records, maps, and depth of outfall shows the location noted above under "General Information" to be the correct location. Several video scans of the outfall pipe during each of the past several years show it to be in good condition with no apparent leaks.

Secondary treated and disinfected effluent is discharged from the facility through a diffuser that has four six-inch diameter ports each 28 feet apart.

**RESIDUAL SOLIDS**

The sludge from the treatment system is digested in an existing 28 foot diameter 60,000 gallon tank, moved to a gravity thickening tank and finally to a 4,000 gallon holding tank before it is trucked off site. The sludge is hauled by the City of Bainbridge and land applied to forest lands owned by Pope Resources. Sludge land application by Pope Resources must be administered under the State Wide General Permit for Biosolids Management. Over the last two years (1998-1999) the plant has averaged 4,864 pounds of sludge per month. The average amount of sludge per day was 160 pounds and averaged 1.33 percent solids (2.1 lbs dry weight per day). The handling of sludge is covered in the Operations and Maintenance manual for the facility.

Screenings of rags, scum, grit and other solids removed at the headworks and removed as part of the routine maintenance of the equipment are sent to the local landfill.

A new analysis of the sludge will need to be completed in this permit cycle.

*PERMIT STATUS*

The previous permit for this facility was issued on April 4, 1989. The previous permit placed effluent limitations on 5-day Biochemical Oxygen Demand (BOD<sub>5</sub>), Total Suspended Solids (TSS), pH, and Fecal Coliform bacteria.

The following limits were in the 1989 permit:

PARAMETER	MONTHLY AVERAGE	WEEKLY AVERAGE
BOD <sub>5</sub>	30 mg/L, 80 lbs/day	45 mg/L, 120 lbs/day
Suspended Solids	30 mg/L, 80 lbs/day	45 mg/L, 120 lbs/day
Fecal Coliform Bacteria	200/100 ml	400/100 ml
pH	6.0 – 9.0	

An application for permit renewal was submitted to the Department on February 19, 1999.

*SUMMARY OF COMPLIANCE WITH THE PREVIOUS PERMIT*

The facility received its last compliance inspection on August 2, 2000.

During the history of the previous permit, the Permittee has remained in compliance, based on Discharge Monitoring Reports (DMRs) submitted to the Department and inspections conducted by the Department. The facility received a "Compliance Star" award for exceptional operation in 1999.

*WASTEWATER CHARACTERIZATION*

The concentration of pollutants in the discharge was reported in the discharge monitoring reports. The effluent is characterized as follows from 1998-1999 data:

**Table 1: Wastewater Characterization**

<u>Parameter</u>	<u>Influent Concentration</u>	<u>Effluent Concentration</u>
Flow	.152 mgd (annual average)	
pH		6.2 - 7.1
Fecal Coliform		24 col/100 ml (highest Mo. average)
BOD <sub>5</sub>	312 mg/L, 306 lbs/d (highest monthly average)	17 mg/L, 26 lbs/d (highest monthly average)
TSS	338 mg/L, 328 lbs/d (highest monthly average)	21 mg/L, 24 lbs/d (highest monthly average)
Dissolved Oxygen		6.0 mg/L (lowest monthly average)

There does not appear to be any discharges from industrial or commercial facilities that might produce toxic pollutants in quantities of concern.

**PROPOSED PERMIT LIMITATIONS**

Federal and State regulations require that effluent limitations set forth in a NPDES permit must be either technology- or water quality-based. Technology-based limitations for municipal discharges are set by regulation (40 CFR 133, and Chapters 173-220 and 173-221 WAC). Water quality-based limitations are based upon compliance with the Surface Water Quality Standards (Chapter 173-201A WAC), Ground Water Standards (Chapter 173-200 WAC), Sediment Quality Standards (Chapter 173-204 WAC) or the National Toxics Rule (Federal Register, Volume 57, No. 246, Tuesday, December 22, 1992.) The most stringent of these types of limits must be chosen for each of the parameters of concern. Each of these types of limits is described in more detail below.

The limits in this permit are based in part on information received in the application and DMRs. The effluent constituents were evaluated on a technology- and water quality-basis. The limits necessary to meet the rules and regulations of the State of Washington were determined and included in this permit. Ecology does not develop effluent limits for all pollutants that may be reported on the application as present in the effluent. Some pollutants are not treatable at the concentrations reported, are not controllable at the source, are not listed in regulation, and do not have a reasonable potential to cause a water quality violation. Effluent limits are not always developed for pollutants that may be in the discharge but not reported as present in the application. In those circumstances the permit does not authorize discharge of the non-reported pollutants. Effluent discharge conditions may change from the conditions reported in the permit application. If significant changes occur in any constituent, as described in 40 CFR 122.42(a), the Permittee is required to notify the Department of Ecology. The Permittee may be in violation of the permit until the permit is modified to reflect additional discharge of pollutants.

### DESIGN CRITERIA

In accordance with WAC 173-220-150 (1)(g), flows or waste loadings shall not exceed approved design criteria.

The design criteria for this treatment facility are taken from the 1989 permit and the April 1989 As-Built engineering report prepared by H. R. Esvelt Engineering. In the 1989 permit there were interim values and final values. The final values were based on the addition of a third aeration basin which has not been built. These design standards for interim and final design still apply and are as follows:

**Table 2: Interim and Final Design Standards for Port Ludlow WWTP.**

Parameter	Interim Design Quantity	Final Design Quantity
Monthly average wet weather flow	0.32 mgd	0.64 mgd
Instantaneous peak hourly flow	680 gpm	1,200 gpm
BOD <sub>5</sub> influent loading	780 lbs/day	1,600 lbs/day
TSS influent loading	780 lbs/day	1,600 lbs/day
Design population equivalent	2,700 people (2,036 on 2/99)	5400 people

### TECHNOLOGY-BASED EFFLUENT LIMITATIONS

Municipal wastewater treatment plants are a category of discharger for which technology-based effluent limits have been promulgated by federal and state regulations. These effluent limitations are given in the Code of Federal Regulations (CFR) 40 CFR Part 133 (federal) and in Chapter 173-221 WAC (state). These regulations are performance standards that constitute all known available and reasonable methods of prevention, control, and treatment for municipal wastewater.

The following technology-based limits for pH, fecal coliform, BOD<sub>5</sub>, and TSS are taken from Chapter 173-221 WAC:

**Table 3: Technology-based Limits.**

Parameter	Limit
pH:	shall be within the range of 6 to 9 standard units.
Fecal Coliform Bacteria	Monthly Geometric Mean = 200 organisms/100 mL Weekly Geometric Mean = 400 organisms/100 mL
BOD <sub>5</sub> (concentration)	Average Monthly Limit is the most stringent of the following: - 30 mg/L - may not exceed fifteen percent (15%) of the average influent concentration Average Weekly Limit = 45 mg/L
TSS (concentration)	Average Monthly Limit is the most stringent of the following: - 30 mg/L - may not exceed fifteen percent (15%) of the average influent concentration Average Weekly Limit = 45 mg/L
Chlorine Residual	Average Monthly Limit = 0.5 mg/L Average Weekly Limit = 0.75 mg/L



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The following technology-based mass limits are based on WAC 173-220-130(3)(b) and 173-221-030(11)(b).

Monthly effluent mass loadings (lbs/day) were calculated as the maximum monthly design flow (0.32 MGD) x Concentration limit (30 mg/L) x 8.34 (conversion factor) = mass limit 80 lb./day.

The weekly average effluent mass loading is calculated as 1.5 x monthly loading = 120 lbs/day.

*SURFACE WATER QUALITY-BASED EFFLUENT LIMITATIONS*

In order to protect existing water quality and preserve the designated beneficial uses of Washington's surface waters, WAC 173-201A-060 states that waste discharge permits shall be conditioned such that the discharge will meet established Surface Water Quality Standards. The Washington State Surface Water Quality Standards (Chapter 173-201A WAC) is a state regulation designed to protect the beneficial uses of the surface waters of the state. Water quality-based effluent limitations may be based on an individual waste load allocation (WLA) or on a WLA developed during a basin-wide total maximum daily loading study (TMDL).

Outer Admiralty Inlet has shown low dissolved oxygen, however this appears to be a natural occurrence, and is therefore not on the 303(d) list.

*NUMERICAL CRITERIA FOR THE PROTECTION OF AQUATIC LIFE*

"Numerical" water quality criteria are numerical values set forth in the State of Washington's Water Quality Standards for Surface Waters (Chapter 173-201A WAC). They specify the levels of pollutants allowed in a receiving water while remaining protective of aquatic life. Numerical criteria set forth in the Water Quality Standards are used along with chemical and physical data for the wastewater and receiving water to derive the effluent limits in the discharge permit. When surface water quality-based limits are more stringent or potentially more stringent than technology-based limitations, they must be used in a permit.

Port Ludlow does not serve commercial and industrial customers, so there is little likelihood of toxic pollutants that would effect aquatic life especially with the large dilution factors of 125:1 for acute and 3100:1 for chronic with this plant. Toxic pollutant analysis is a requirement of this permit and may be evaluated in the next permit term.

*NUMERICAL CRITERIA FOR THE PROTECTION OF HUMAN HEALTH*

The state was issued 91 numeric water quality criteria for the protection of human health by the U.S. EPA (EPA 1992). These criteria are designed to protect humans from cancer and other disease and are primarily applicable to fish and shellfish consumption and drinking water from surface waters.

The nearest geoduck shellfish bed is approximately one-half mile from the discharge. There have been no closures due to the discharge from this Permittee.

*NARRATIVE CRITERIA*

In addition to numerical criteria, "narrative" water quality criteria (WAC 173-201A-030) limit toxic, radioactive, or deleterious material concentrations below those which have the potential to adversely affect characteristic water uses, cause acute or chronic toxicity to biota, impair aesthetic values, or adversely affect human health. Narrative criteria protect the specific beneficial uses of all fresh (WAC 173-201A-130) and marine (WAC 173-201A-140) waters in the state of Washington.

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ANTIDEGRADATION

The state of Washington's Antidegradation Policy requires that discharges into a receiving water shall not further degrade the existing water quality of the water body. In cases where the natural conditions of a receiving water are of lower quality than the criteria assigned, the natural conditions shall constitute the water quality criteria. Similarly, when the natural conditions of a receiving water are of higher quality than the criteria assigned, the natural conditions shall constitute the water quality criteria. More information on the State Antidegradation Policy can be obtained by referring to WAC 173-201A-070.

Water quality data was collected from Port Ludlow every year from 1989 to 1997. The conclusions of the last report entitled "1997 Water Quality Conditions of Port Ludlow Bay" by Berryman & Henigar, Inc/Vasey Engineering Co. show that water quality consistently met Class AA standards with the exception of dissolved oxygen. The dissolved oxygen was presumed to be lower because of a combination of low background DO and/or temporary stratification. The station in the vicinity of the outfall was not significantly different from a background station in Admiralty Inlet for all water quality measurements with the exception of chlorophyll-a. The following values were taken from the 1997 Berryman, et. al. report for station two which was the closest station to the outfall. The values are means of all values including the top and bottom measurement and should fairly well represent the ambient conditions for the conventional parameters.

Temp deg. C	pH	Dissolved Oxygen mg/L	Ammonia ug/L	Fecal Coliform col/100ml
13.1	7.99	8.4	48.4	<2

The ambient water quality conditions are not greatly different than the water quality standards for these waters, therefore, the existing water quality standards will continue to be used.

CRITICAL CONDITIONS

Surface water quality-based limits are derived for the waterbody's critical condition, which represents the receiving water and waste discharge condition with the highest potential for adverse impact on the aquatic biota, human health, and existing or characteristic water body uses. The ammonia reasonable potential calculation used the highest ambient temperature and lowest and highest pH from all stations.

MIXING ZONES

The Water Quality Standards allow the Department of Ecology to authorize mixing zones around a point of discharge in establishing surface water quality-based effluent limits. Both "acute" and "chronic" mixing zones may be authorized for pollutants that can have a toxic effect on the aquatic environment near the point of discharge. The concentration of pollutants at the boundary of these mixing zones may not exceed the numerical criteria for that type of zone. Mixing zones can only be authorized for discharges that are receiving all known, available, and reasonable methods of prevention, control and treatment (AKART) and in accordance with other mixing zone requirements of WAC 173-201A-100.

The National Toxics Rule (EPA, 1992) allows the chronic mixing zone to be used to meet human health criteria. A dilution factor was calculated for the reasonable potential determination and other evaluations using the COMIX1 model. The horizontal dimensions of the acute and chronic zones were 8.96 m and 89.6 m respectively. These input dimensions resulted in an acute ratio of 125:1 and a chronic ratio of 3100:1. The results of the CORMIX1 analysis may be found in appendix C. See also the section on: "Consideration of Water Quality Based Limits."

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DESCRIPTION OF THE RECEIVING WATER

The facility discharges to outer Port Ludlow Bay and Admiralty Inlet which is designated as a Class AA receiving water in the vicinity of the outfall. There do not appear to be any significant nearby point sources of pollution. The water quality of all significant surface water streams flowing into Port Ludlow Bay has been monitored annually since 1989. The monitoring was conducted by Pope Resources as a condition of sub-division approvals by Jefferson County. Consultants for Pope Resources, Berryman & Henigar, have stated the following: "Monitoring results have shown very low pollutant loads during base flows and relatively low pollutant loads during storm flow. Port Ludlow Bay water quality criteria for fecal coliform may be exceeded in the immediate vicinity of the mouths of some of these tributaries during some storms. Otherwise, loads from these tributaries have little impact on the bay water quality, particularly in consideration of the daily dilution from large currents circulating in from Admiralty Inlet. Potential non-point pollution sources other than tributaries include near-shore septic systems, water fowl, marine mammals, pets, marina and recreational boaters."

However, there are also significant numbers of livestock in portions of the Beaver Valley above Port Ludlow Bay. Whether these livestock are in the portions of the drainage that drains to the bay is not clear. One thing that is clear is that the lower portions of the drainage that surround Port Ludlow Bay are taken up by the Port Ludlow development and therefore do not significantly contribute nonpoint sources of pollution.

Characteristic uses include the following:

water supply (domestic, industrial, agricultural); stock watering; fish migration; fish and shellfish rearing, spawning and harvesting; wildlife habitat; primary contact recreation; sport fishing; boating and aesthetic enjoyment; commerce and navigation.

Water quality of this class shall markedly and uniformly exceed the requirements for all or substantially all uses.

SURFACE WATER QUALITY CRITERIA

Applicable criteria are defined in Chapter 173-201A WAC for aquatic biota. In addition, U.S. EPA has promulgated human health criteria for toxic pollutants (EPA 1992). Criteria for this discharge are summarized below:

Fecal Coliforms	14 organisms/100 mL maximum geometric mean
Dissolved Oxygen	8 mg/L minimum
Temperature	18 degrees Celsius maximum or incremental increases above background
pH	6.5 to 8.5 standard units
Turbidity	Less than 5 NTUs above background
Toxics	No toxics in toxic amounts (see Appendix C for numeric criteria for toxics of concern for this discharge)

CONSIDERATION OF SURFACE WATER QUALITY-BASED LIMITS FOR NUMERIC CRITERIA

Pollutant concentrations in the proposed discharge exceed water quality criteria with technology-based controls which the Department has determined to be AKART. A mixing zone is authorized in accordance

with the geometric configuration, flow restriction, and other restrictions for mixing zones in Chapter 173-201A WAC and are defined as follows:

The parameters used in determining dilution include the following:

Depth to top of diffuser ports	Width of diffuser	Chronic = $400+2\text{Depth}+$ width of diffuser	Acute = 0.1(chronic)	CORMIX1 chronic and acute dilution
52'	84'	$400+2(54)+84 =$ 588' dia (29.4 m radius)	8.96 m radius	3100:1 Chronic  125:1 Acute

The dilution factors of effluent to receiving water that occur within these zones have been determined at the critical condition by the use of the CORMIX1 model. The dilution factors have been determined to be (from Appendix C):

	Acute	Chronic
Aquatic Life	125:1	3100:1
Human Health, Carcinogen		3100:1
Human Health, Non-carcinogen		3100:1

Pollutants in an effluent may affect the aquatic environment near the point of discharge (near field) or at a considerable distance from the point of discharge (far field). Toxic pollutants, for example, are near-field pollutants--their adverse effects diminish rapidly with mixing in the receiving water. Conversely, a pollutant such as BOD is a far-field pollutant whose adverse effect occurs away from the discharge even after dilution has occurred. Thus, the method of calculating water quality-based effluent limits varies with the point at which the pollutant has its maximum effect.

The derivation of water quality-based limits also takes into account the variability of the pollutant concentrations in both the effluent and the receiving water.

BOD<sub>5</sub>--This discharge with technology-based limitations results in a small amount of BOD loading relative to the large amount of dilution occurring in the receiving water at critical conditions. Technology-based limitations will be protective of dissolved oxygen criteria in the receiving water.

Temperature--The impact of the discharge on the temperature of the receiving water was modeled by simple mixing analysis at critical condition. The receiving water temperature at the critical condition is 13.1 °C and the effluent temperature is 20 °C. The predicted resultant temperature at the boundary of the chronic mixing zone is 13.10°C and the incremental rise is less than 0.01 °C. See Appendix C.

Under critical conditions there is no predicted violation of the Water Quality Standards for Surface Waters. Therefore, no effluent limitation for temperature was placed in the proposed permit.

pH--Because of the high buffering capacity of marine water, compliance with the technology-based limits of 6 to 9 will assure compliance with the Water Quality Standards for Surface Waters. In the last two years the plant effluent has not dropped below a pH of 6.0 or exceeded pH of 7.1. With the large dilution factor, the pH will be further diluted at the edge of the mixing zone.

Fecal coliform--The numbers of fecal coliform were modeled by simple mixing analysis using the technology-based limit of 400 organisms per 100 ml and a dilution factor of 3100. See Appendix C.

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Under critical conditions there is no predicted violation of the Water Quality Standards for Surface Waters with the technology-based limit. Therefore, the technology-based effluent limitation for fecal coliform bacteria was placed in the proposed permit.

Toxic Pollutants--Federal regulations (40 CFR 122.44) require NPDES permits to contain effluent limits for toxic chemicals in an effluent whenever there is a reasonable potential for those chemicals to exceed the surface water quality criteria. This process occurs concurrently with the derivation of technology-based effluent limits. Facilities with technology-based effluent limits defined in regulation are not exempted from meeting the Water Quality Standards for Surface Waters or from having surface water quality-based effluent limits.

The following toxics were determined to be present in the discharge: chlorine, and ammonia. A reasonable potential analysis (See Appendix C) was conducted on these parameters to determine whether or not effluent limitations would be required in this permit. There was no reasonable potential to cause a violation of the chlorine or ammonia criteria. A reasonable potential analysis has not been conducted for metals. No effluent metals testing has been required in the past because the plant is under 0.5 mgd. If the plant upgrades to 0.64 mgd as planned, metals testing will be required in the next permit.

No valid ambient background data was available for other toxic pollutants.

#### WHOLE EFFLUENT TOXICITY

The Water Quality Standards for Surface Waters require that the effluent not cause toxic effects in the receiving waters. Many toxic pollutants cannot be detected by commonly available detection methods. However, toxicity can be measured directly by exposing living organisms to the wastewater in laboratory tests and measuring the response of the organisms. Toxicity tests measure the aggregate toxicity of the whole effluent, and therefore this approach is called whole effluent toxicity (WET) testing.

Because Port Ludlow does not have industry producing or discharging toxic chemicals, toxicity caused by unidentified pollutants is not expected in the effluent from this discharge as determined by the screening criteria given in Chapter 173-205 WAC. Therefore, no whole effluent toxicity testing is required in this permit. The Department may require effluent toxicity testing in the future if it receives information that toxicity may be present in this effluent.

#### HUMAN HEALTH

Washington's water quality standards now include 91 numeric health-based criteria that must be considered in NPDES permits. These criteria were promulgated for the state by the U.S. EPA in its National Toxics Rule (Federal Register, Volume 57, No. 246, Tuesday, December 22, 1992).

The Department has determined that the applicant's discharge does not contain chemicals of concern based on existing data or knowledge. The discharge will be re-evaluated for impacts to human health at the next permit reissuance.

#### SEDIMENT QUALITY

The Department has promulgated aquatic sediment standards (Chapter 173-204 WAC) to protect aquatic biota and human health. These standards state that the Department may require Permittees to evaluate the potential for the discharge to cause a violation of applicable standards (WAC 173-204-400).

The Department has determined through a review of the discharger characteristics and effluent characteristics that this discharge has no reasonable potential to violate the Sediment Management Standards.

## **MONITORING REQUIREMENTS**

Monitoring, recording, and reporting are required (WAC 173-220-210 and 40 CFR 122.41) to verify that the treatment process is functioning correctly and the effluent limitations are being achieved.

Monitoring of sludge quantity and quality is necessary to determine the appropriate uses of the sludge. Sludge monitoring is required by the current state and local solid waste management program and also by EPA under 40 CFR 503.

The monitoring schedule is detailed in the proposed permit under Condition S.2. Specified monitoring frequencies take into account the quantity and variability of discharge, the treatment method, past compliance, significance of pollutants, and cost of monitoring. The required monitoring frequency is consistent with agency guidance given in the current version of Ecology's *Permit Writer's Manual* (July 1994) for a facility with secondary activated sludge treatment.

### *LAB ACCREDITATION*

With the exception of certain parameters the permit requires all monitoring data to be prepared by a laboratory registered or accredited under the provisions of Chapter 173-50 WAC, *Accreditation of Environmental Laboratories*. The laboratory at this facility is accredited for: BOD, chlorine residual, pH, TSS, and fecal coliform.

## **OTHER PERMIT CONDITIONS**

### *REPORTING AND RECORDKEEPING*

The conditions of S3. are based on the authority to specify any appropriate reporting and recordkeeping requirements to prevent and control waste discharges (WAC 173-220-210).

### *PREVENTION OF FACILITY OVERLOADING*

Overloading of the treatment plant is a violation of the terms and conditions of the permit. To prevent this from occurring, RCW 90.48.110 and WAC 173-220-150 require the Permittee to take the actions detailed in proposed permit requirement S.4. to plan expansions or modifications before existing capacity is reached and to report and correct conditions that could result in new or increased discharges of pollutants. Condition S.4. restricts the amount of flow.

### *OPERATION AND MAINTENANCE (O&M)*

The proposed permit contains condition S.5. as authorized under RCW 90.48.110, WAC 173-220-150, Chapter 173-230 WAC, and WAC 173-240-080. It is included to ensure proper operation and regular maintenance of equipment, and to ensure that adequate safeguards are taken so that constructed facilities are used to their optimum potential in terms of pollutant capture and treatment.

### *RESIDUAL SOLIDS HANDLING*

To prevent water quality problems the Permittee is required in permit condition S7. to store and handle all residual solids (grit, screenings, scum, sludge, and other solid waste) in accordance with the requirements of RCW 90.48.080 and State Water Quality Standards.

The final use and disposal of sewage sludge from this facility is regulated by U.S. EPA under 40 CFR 503. The disposal of other solid waste is under the jurisdiction of the Jefferson County Health Department.

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Requirements for monitoring sewage sludge and recordkeeping are included in this permit. This information will be used by Ecology to develop or update local limits and is also required under 40 CFR 503.

*OUTFALL EVALUATION*

Proposed permit condition S.8. requires the Permittee to conduct an outfall inspection and submit a report detailing the findings of that inspection once near the end of the five year permit cycle. The purpose of the inspection is to determine the condition of the discharge pipe and diffusers and to determine if sediment is accumulating in the vicinity of the outfall. In the past, the Permittee has conducted video evaluations of the pipe line once each year ending with the last evaluation conducted in 1997. No problems were seen in any of the past evaluations.

*GENERAL CONDITIONS*

General Conditions are based directly on state and federal law and regulations and have been standardized for all individual municipal NPDES permits issued by the Department.

**PERMIT ISSUANCE PROCEDURES**

*PERMIT MODIFICATIONS*

The Department may modify this permit to impose numerical limitations, if necessary to meet Water Quality Standards, Sediment Quality Standards, or Ground Water Standards, based on new information obtained from sources such as inspections, effluent monitoring, outfall studies, and effluent mixing studies.

The Department may also modify this permit as a result of new or amended state or federal regulations.

*RECOMMENDATION FOR PERMIT ISSUANCE*

This proposed permit meets all statutory requirements for authorizing a wastewater discharge, including those limitations and conditions believed necessary to protect human health, aquatic life, and the beneficial uses of waters of the state of Washington. The Department proposes that this permit be issued for five years.

## REFERENCES FOR TEXT AND APPENDICES

### Environmental Protection Agency (EPA)

1992. National Toxics Rule. Federal Register, V. 57, No. 246, Tuesday, December 22, 1992.
1991. Technical Support Document for Water Quality-based Toxics Control. EPA/505/2-90-001.
1988. Technical Guidance on Supplementary Stream Design Conditions for Steady State Modeling. USEPA Office of Water, Washington, D.C.
1985. Water Quality Assessment: A Screening Procedure for Toxic and Conventional Pollutants in Surface and Ground Water. EPA/600/6-85/002a.
1983. Water Quality Standards Handbook. USEPA Office of Water, Washington, D.C.

### Metcalf and Eddy.

1991. Wastewater Engineering, Treatment, Disposal, and Reuse. Third Edition.

### Tsivoglou, E.C., and J.R. Wallace.

1972. Characterization of Stream Reaeration Capacity. EPA-R3-72-012. (Cited in EPA 1985 op.cit.)

### Washington State Department of Ecology.

1994. Permit Writer's Manual. Publication Number 92-109

### Water Pollution Control Federation.

1976. Chlorination of Wastewater.

### Wright, R.M., and A.J. McDonnell.

1979. In-stream Deoxygenation Rate Prediction. Journal Environmental Engineering Division, ASCE. 105(EE2). (Cited in EPA 1985 op.cit.)



## APPENDIX A--PUBLIC INVOLVEMENT INFORMATION

The Department has tentatively determined to reissue a permit to the applicant listed on page 1 of this fact sheet. The permit contains conditions and effluent limitations which are described in the rest of this fact sheet.

Public notice of application was published on October 12, 2000, and October 19, 2000, in *Port Townsend Leader* to inform the public that an application had been submitted and to invite comment on the reissuance (or issuance) of this permit.

The Department published a Public Notice of Draft (PNOD) on February 25, 2001, in *Port Townsend Leader* to inform the public that a draft permit and fact sheet are available for review. Interested persons are invited to submit written comments regarding the draft permit. The draft permit, fact sheet, and related documents are available for inspection and copying between the hours of 8:00 a.m. and 5:00 p.m. weekdays, by appointment, at the regional office listed below. Written comments should be mailed to:

Carey Grunenfelder  
Water Quality Permit Coordinator  
Department of Ecology  
Southwest Regional Office  
PO Box 47775  
Olympia, WA 98504-7775.

Any interested party may comment on the draft permit or request a public hearing on this draft permit within the 30 day comment period to the address above. The request for a hearing shall indicate the interest of the party and the reasons why the hearing is warranted. The Department will hold a hearing if it determines there is a significant public interest in the draft permit (WAC 173-220-090). Public notice regarding any hearing will be circulated at least thirty (30) days in advance of the hearing. People expressing an interest in this permit will be mailed an individual notice of hearing (WAC 173-220-100).

Comments should reference specific text followed by proposed modification or concern when possible. Comments may address technical issues, accuracy and completeness of information, the scope of the facility's proposed coverage, adequacy of environmental protection, permit conditions, or any other concern that would result from issuance of this permit.

The Department will consider all comments received within 30 days from the date of public notice of draft indicated above, in formulating a final determination to issue, revise, or deny the permit. The Department's response to all significant comments is available upon request and will be mailed directly to people expressing an interest in this permit.

Further information may be obtained from the Department by telephone, (360) 407-6554, or by writing to the address listed above.

This permit and fact sheet were written by Eric Schlorff.

## APPENDIX B--GLOSSARY

**Acute Toxicity**--The lethal effect of a pollutant on an organism that occurs within a short period of time, usually 48 to 96 hours.

**AKART**-- An acronym for "all known, available, and reasonable methods of prevention, control, and treatment".

**Ambient Water Quality**--The existing environmental condition of the water in a receiving water body.

**Ammonia**--Ammonia is produced by the breakdown of nitrogenous materials in wastewater. Ammonia is toxic to aquatic organisms, exerts an oxygen demand, and contributes to eutrophication. It also increases the amount of chlorine needed to disinfect wastewater.

**Average Monthly Discharge Limitation** --The highest allowable average of daily discharges over a calendar month, calculated as the sum of all daily discharges measured during a calendar month divided by the number of daily discharges measured during that month (except in the case of fecal coliform). The daily discharge is calculated as the average measurement of the pollutant over the day.

**Average Weekly Discharge Limitation** -- The highest allowable average of daily discharges over a calendar week, calculated as the sum of all daily discharges measured during a calendar week divided by the number of daily discharges measured during that week. The daily discharge is calculated as the average measurement of the pollutant over the day.

**Best Management Practices (BMPs)**--Schedules of activities, prohibitions of practices, maintenance procedures, and other physical, structural and/or managerial practices to prevent or reduce the pollution of waters of the State. BMPs include treatment systems, operating procedures, and practices to control: plant site runoff, spillage or leaks, sludge or waste disposal, or drainage from raw material storage. BMPs may be further categorized as operational, source control, erosion and sediment control, and treatment BMPs.

**BOD<sub>5</sub>**--Determining the Biochemical Oxygen Demand of an effluent is an indirect way of measuring the quantity of organic material present in an effluent that is utilized by bacteria. The BOD<sub>5</sub> is used in modeling to measure the reduction of dissolved oxygen in a receiving water after effluent is discharged. Stress caused by reduced dissolved oxygen levels makes organisms less competitive and less able to sustain their species in the aquatic environment. Although BOD is not a specific compound, it is defined as a conventional pollutant under the federal Clean Water Act.

**Bypass**--The intentional diversion of waste streams from any portion of a treatment facility.

**Chlorine**--Chlorine is used to disinfect wastewaters of pathogens harmful to human health. It is also extremely toxic to aquatic life.

**Chronic Toxicity**--The effect of a pollutant on an organism over a relatively long time, often 1/10 of an organism's lifespan or more. Chronic toxicity can measure survival, reproduction or growth rates, or other parameters to measure the toxic effects of a compound or combination of compounds.

**Clean Water Act (CWA)**--The Federal Water Pollution Control Act enacted by Public Law 92-500, as amended by Public Laws 95-217, 95-576, 96-483, 97-117; USC 1251 et seq.

**Combined Sewer Overflow (CSO)**--The event during which excess combined sewage flow caused by inflow is discharged from a combined sewer, rather than conveyed to the sewage treatment plant because either the capacity of the treatment plant or the combined sewer is exceeded.

**Compliance Inspection - Without Sampling**--A site visit for the purpose of determining the compliance of a facility with the terms and conditions of its permit or with applicable statutes and regulations.

**Compliance Inspection - With Sampling**--A site visit to accomplish the purpose of a Compliance Inspection - Without Sampling and as a minimum, sampling and analysis for all parameters with limits in the permit to ascertain compliance with those limits; and, for municipal facilities, sampling of influent to ascertain compliance with the percent removal requirement. Additional sampling may be conducted.

**Composite Sample**--A mixture of grab samples collected at the same sampling point at different times, formed either by continuous sampling or by mixing a minimum of four discrete samples. May be "time-composite"(collected at constant time intervals) or "flow-proportional" (collected either as a constant sample volume at time intervals proportional to stream flow, or collected by increasing the volume of each aliquot as the flow increased while maintaining a constant time interval between the aliquots.

**Construction Activity**--Clearing, grading, excavation and any other activity which disturbs the surface of the land. Such activities may include road building, construction of residential houses, office buildings, or industrial buildings, and demolition activity.

**Continuous Monitoring** --Uninterrupted, unless otherwise noted in the permit.

**Critical Condition**--The time during which the combination of receiving water and waste discharge conditions have the highest potential for causing toxicity in the receiving water environment. This situation usually occurs when the flow within a water body is low, thus, its ability to dilute effluent is reduced.

**Dilution Factor**--A measure of the amount of mixing of effluent and receiving water that occurs at the boundary of the mixing zone. Expressed as the inverse of the effluent fraction e.g., a dilution factor of 10 means the effluent comprises 10% by volume and the receiving water 90%.

**Engineering Report**--A document which thoroughly examines the engineering and administrative aspects of a particular domestic or industrial wastewater facility. The report shall contain the appropriate information required in WAC 173-240-060 or 173-240-130.

**Fecal Coliform Bacteria**--Fecal coliform bacteria are used as indicators of pathogenic bacteria in the effluent that are harmful to humans. Pathogenic bacteria in wastewater discharges are controlled by disinfecting the wastewater. The presence of high numbers of fecal coliform bacteria in a water body can indicate the recent release of untreated wastewater and/or the presence of animal feces.

**Grab Sample**--A single sample or measurement taken at a specific time or over as short period of time as is feasible.

**Industrial User**-- A discharger of wastewater to the sanitary sewer which is not sanitary wastewater or is not equivalent to sanitary wastewater in character.

**Industrial Wastewater**--Water or liquid-carried waste from industrial or commercial processes, as distinct from domestic wastewater. These wastes may result from any process or activity of industry, manufacture, trade or business, from the development of any natural resource, or from animal operations such as feed lots, poultry houses, or dairies. The term includes contaminated storm water and, also, leachate from solid waste facilities.

**Infiltration and Inflow (I/I)**--"Infiltration" means the addition of ground water into a sewer through joints, the sewer pipe material, cracks, and other defects. "Inflow" means the addition of precipitation-caused drainage from roof drains, yard drains, basement drains, street catch basins, etc., into a sewer.

**Interference** -- A discharge which, alone or in conjunction with a discharge or discharges from other sources, both:

Inhibits or disrupts the POTW, its treatment processes or operations, or its sludge processes, use or disposal and;

Therefore is a cause of a violation of any requirement of the POTW's NPDES permit (including an increase in the magnitude or duration of a violation) or of the prevention of sewage sludge use or disposal in compliance with the following statutory provisions and regulations or permits issued thereunder (or more stringent State or local regulations): Section 405 of the Clean Water Act, the Solid Waste Disposal Act (SWDA) (including title II, more commonly referred to as the Resource Conservation and Recovery Act (RCRA), and including State regulations contained in any State sludge management plan prepared pursuant to subtitle D of the SWDA), sludge regulations appearing in 40 CFR Part 507, the Clean Air Act, the Toxic Substances Control Act, and the Marine Protection, Research and Sanctuaries Act.

**Major Facility**--A facility discharging to surface water with an EPA rating score of > 80 points based on such factors as flow volume, toxic pollutant potential, and public health impact.

**Maximum Daily Discharge Limitation**--The highest allowable daily discharge of a pollutant measured during a calendar day or any 24-hour period that reasonably represents the calendar day for purposes of sampling. The daily discharge is calculated as the average measurement of the pollutant over the day.

**Method Detection Level (MDL)**--The minimum concentration of a substance that can be measured and reported with 99% confidence that the analyte concentration is above zero and is determined from analysis of a sample in a given matrix containing the analyte.

**Minor Facility**--A facility discharging to surface water with an EPA rating score of < 80 points based on such factors as flow volume, toxic pollutant potential, and public health impact.

**Mixing Zone**--A volume that surrounds an effluent discharge within which water quality criteria may be exceeded. The area of the authorized mixing zone is specified in a facility's permit and follows procedures outlined in State regulations (Chapter 173-201A WAC).

**National Pollutant Discharge Elimination System (NPDES)**--The NPDES (Section 402 of the Clean Water Act) is the Federal wastewater permitting system for discharges to navigable waters of the United States. Many states, including the State of Washington, have been delegated the authority to issue these permits. NPDES permits issued by Washington State permit writers are joint NPDES/State permits issued under both State and Federal laws.

**Pass through** -- A discharge which exits the POTW into waters of the-State in quantities or concentrations which, alone or in conjunction with a discharge or discharges from other sources, is a cause of a violation of any requirement of the POTW's NPDES permit (including an increase in the magnitude or duration of a violation), or which is a cause of a violation of State water quality standards.

**pH**--The pH of a liquid measures its acidity or alkalinity. A pH of 7 is defined as neutral, and large variations above or below this value are considered harmful to most aquatic life.

**Potential Significant Industrial User**--A potential significant industrial user is defined as an Industrial User which does not meet the criteria for a Significant Industrial User, but which discharges wastewater meeting one or more of the following criteria:

- a. Exceeds 0.5 % of treatment plant design capacity criteria and discharges <25,000 gallons per day or;
- b. Is a member of a group of similar industrial users which, taken together, have the potential to cause pass through or interference at the POTW (e.g. facilities which develop photographic film or paper, and car washes).

The Department may determine that a discharger initially classified as a potential significant industrial user should be managed as a significant industrial user.

**Quantitation Level (QL)**-- A calculated value five times the MDL (method detection level).

**Significant Industrial User (SIU)**--

- 1) All industrial users subject to Categorical Pretreatment Standards under 40 CFR 403.6 and 40 CFR Chapter I, Subchapter N and;
- 2) Any other industrial user that: discharges an average of 25,000 gallons per day or more of process wastewater to the POTW (excluding sanitary, noncontact cooling, and boiler blow-down wastewater); contributes a process wastestream that makes up 5 percent or more of the average dry weather hydraulic or organic capacity of the POTW treatment plant; or is designated as such by the Control Authority\* on the basis that the industrial user has a reasonable potential for adversely affecting the POTW's operation or for violating any pretreatment standard or requirement (in accordance with 40 CFR 403.8(f)(6)).

Upon finding that the industrial user meeting the criteria in paragraph 2, above, has no reasonable potential for adversely affecting the POTW's operation or for violating any pretreatment standard or requirement, the Control Authority\* may at any time, on its own initiative or in response to a petition received from an industrial user or POTW, and in accordance with 40 CFR 403.8(f)(6), determine that such industrial user is not a significant industrial user.

\*The term "Control Authority" refers to the Washington State Department of Ecology in the case of non-delegated POTWs or to the POTW in the case of delegated POTWs.

**State Waters**--Lakes, rivers, ponds, streams, inland waters, underground waters, salt waters, wetlands, and all other surface waters and watercourses within the jurisdiction of the state of Washington.

**Stormwater**--That portion of precipitation that does not naturally percolate into the ground or evaporate, but flows via overland flow, interflow, pipes, and other features of a storm water drainage system into a defined surface water body, or a constructed infiltration facility.

**Technology-based Effluent Limit**--A permit limit that is based on the ability of a treatment method to reduce the pollutant.

**Total Suspended Solids (TSS)**--Total suspended solids are the particulate materials in an effluent. Large quantities of TSS discharged to a receiving water may result in solids accumulation. Apart from any toxic effects attributable to substances leached out by water, suspended solids may kill fish, shellfish, and other aquatic organisms by causing abrasive injuries and by clogging the gills and respiratory passages of various aquatic fauna. Indirectly, suspended solids can screen out light and can promote and maintain the development of noxious conditions through oxygen depletion.

**Upset**--An exceptional incident in which there is unintentional and temporary noncompliance with technology-based permit effluent limitations because of factors beyond the reasonable control of the Permittee. An upset does not include noncompliance to the extent caused by operational error, improperly designed treatment facilities, lack of preventative maintenance, or careless or improper operation.

**Water Quality-based Effluent Limit**--A limit on the concentration or mass of an effluent parameter that is intended to prevent the concentration of that parameter from exceeding its water quality criterion after it is discharged into a receiving water.

## APPENDIX C--TECHNICAL CALCULATIONS

Several of the Excel® spreadsheet tools used to evaluate a discharger's ability to meet Washington State water quality standards can be found on the Department's homepage at <http://www.wa.gov/ecology>.

Ambient maximum temperature and pH values of 16.4 and 8.7 came from a 1997 water quality study of the water quality conditions of Port Ludlow bay. These values represent maximums that will probably not be exceeded.

Calculation of seawater fraction of un-ionized ammonia  
from Hampson (1977). Un-ionized ammonia criteria for  
salt water are from EPA 440/5-88-004.

Based on Lotus File NH3SALT.WK1 Revised 19-Oct-93

### INPUT

1. Temperature (deg C):	16.4
2. pH:	8.7
3. Salinity (g/Kg):	20.0

### OUTPUT

1. Pressure (atm; EPA criteria assumes 1 atm):	1.0
2. Molal Ionic Strength (not valid if >0.85):	0.407
3. pKa8 at 25 deg C (Whitfield model "B"):	9.292
4. Percent of Total Ammonia Present as Unionized:	11.863%
5. Unionized ammonia criteria (mg un-ionized NH3 per liter) from EPA 440/5-88-004	
Acute:	0.233
Chronic:	0.035
6. Total Ammonia Criteria (mg/L as NH3)	
Acute:	1.96
Chronic:	0.30
7. Total Ammonia Criteria (mg/L as NH3-N)	

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Acute: 1.61  
Chronic: 0.24

The dilution factors used for the following table came from values estimated by CORMIX1 model. The max effluent concentration of ammonia input to the following spreadsheet came from a 1997 Vassey Engineering report on the composition of treated sewage effluent from Port Ludlow: *1997 Water Quality Conditions of Port Ludlow Bay*. The chlorine input values came from DMRs from 1/99-3/00.

Reasonable Potential Spreadsheet

				State Water Quality Standard		Max concentration at edge of...		
	Metal Criteria Translator as decimal	Metal Criteria Translator as decimal	Ambient Concentration (metals as dissolved)	Acute	Chronic	Acute Mixing Zone	Chronic Mixing Zone	LIMIT REQ'D?
Parameter	Acute	Chronic	ug/L	ug/L	ug/L	ug/L	ug/L	
Chlorine	0.95	0.95		13.0000	7.5000	12.86	0.52	NO
Ammonia	0.95	0.95		233.00	35.00	94.92	3.83	NO
CALCULATIONS								
Effluent percentile value	Max effluent conc. measured (metals as total recoverable)	Coeff Variation	# of samples	Multiplier	Acute Dil'n Factor	Chronic Dil'n Factor		
	<i>P<sub>n</sub></i>	<i>ug/L</i>	<i>CV</i>	<i>s</i>	<i>n</i>			
0.95	0.983	2200.00	0.60	0.55	174	0.77	125	3100
0.95	0.688	6580.00	0.60	0.55	8	1.90	125	3100

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Simple mixing model for temperature and fecal coliform						
EFFLUENT TEMP	AMBIENT TEMP	CHRONIC DIL FACTOR	END TEMP	formula used: (eff+(df-1)amb)/df		
20	13.1	3100	13.10			
EFFLUENT FC	AMBIENT FC	CHRONIC DIL FACTOR	END FC			
400	14	3100	14.12			
24	14	3100	14.00			

Plume Flow Model for Dilution

Mar 18, 1998, 10:25:44 ERL-N PROGRAM PLUMES, Ed 3, 3/11/94 Case: I of I

Title Port Ludlow, Acute Dilution, 90th? per vel nonlinear  
tot flow ports port flow spacing effl sal effl temp far inc far dig  
0.01069 4 0.002673 8.534 0.0 20 10 30  
port dep port dia plume dia total vel horiz val vertl vel asp coeff print frq  
16.76 0.1524 0.1190 0.2402 0.2402 0.000 0.10 20  
port elev ver angle cont coef effl den poll conc decay Froude # Roberts F  
0.4572 0 0.61 -1.73284 100 0 1.462 3043  
hor angle red space p amb den p current far dif far vel K:vel/cur Stratif #  
90 8.534 21.3408 0.6000 0.0004543 0.03048 0.4003-0.0001124  
depth current density salinity temp amb conc N (freq) red grav.  
0.1 0.6 21.7062 28.9 13 0 -0.01447 0.2267  
16.76 0.6 21.3408 28.6 13.7 0  
buoy flux puff-ther  
0.7099 0.1043  
jet-plume jet-cros  
0.1638 0.0422  
plu-cross jet-stra  
0.2805 1.32  
plu-strat  
3.761  
CL conc>=

CORMIX1 flow category algorithm is turned off. to range

Help: Fl. Quit: <esc>. Configuration:NTNOI@. FILE: PLMSTUFF.VAR;

UM INITIAL DILUTION CALCULATION (nonlinear mode)

plume dep	plume dia	poll conc	dilution	hor dis
m	m		m	
16.76	0.1190	100.0	1.000	0.000
16.76	0.1168	87.06	1.145	0.03115
16.75	0.1167	75.79	1.312	0.06566
16.75	0.1186	65.98	1.504	0.09655
16.75	0.1218	57.44	1.724	0.1269
16.74	0.1262	50.00	1.977	0.1590
16.74	0.1316	43.53	2.268	0.1943
16.73	0.1378	37.89	2.602	0.2338
16.73	0.1449	32.99	2.985	0.2786



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16.72	0.1529	28.72	3.426	0.3296
16.72	0.1616	25.00	3.932	0.3875
16.71	0.1712	21.76	4.513	0.4533
16.70	0.1817	18.95	5.181	0.5280
16.69	0.1931	16.49	5.948	0.6125
16.69	0.2055	14.36	6.829	0.7081
16.68	0.2189	12.50	7.841	0.8158
16.66	0.2334	10.88	9.004	0.9369
16.65	0.2490	9.473	10.34	1.073
16.64	0.2658	8.247	11.87	1.225
16.63	0.2839	7.180	13.64	1.396
16.61	0.3034	6.250	15.66	1.587
16.60	0.3243	5.441	17.99	1.800
16.58	0.3468	4.737	20.66	2.037
16.56	0.3710	4.124	23.73	2.302
16.54	0.3970	3.590	27.25	2.597
16.52	0.4249	3.125	31.30	2.925
16.50	0.4548	2.721	35.95	3.290
16.47	0.4870	2.368	41.29	3.696
16.45	0.5214	2.062	47.43	4.147
16.42	0.5584	1.795	54.48	4.648
16.39	0.5981	1.563	62.57	5.204
16.35	0.6406	1.360	71.88	5.822
16.32	0.6863	1.184	82.56	6.508
16.28	0.7352	1.031	94.310	7.269
16.24	0.7877	0.8975	108.9	8.114
16.20	0.8439	0.7813	125.1	9.050
16.15	0.9042	0.6801	143.7	10.09
16.10	0.9689	0.5921	165.1	11.24
16.04	1.038	0.5155	189.6	12.51
15.93	1.113	0.4487	217.8	13.92
15.92	1.192	0.3906	250.2	15.48
15.86	1.278	0.3401	287.4	17.21
15.78	1.369	0.2961	330.2	19.12
15.71	1.467	0.2577	379.3	21.22
15.62	1.572	0.2244	435.6	23.54
15.53	1.685	0.1953	500.4	26.09
15.44	1.806	0.1700	574.8	28.89
15.34	1.935	0.1480	660.3	31.97
15.23	2.074	0.1289	758.5	35.32
15.11	2.223	0.1122	871.3	38.98
14.99	2.383	0.09766	1001	42.96
14.85	2.553	0.08502	1150	47.27
14.71	2.737	0.07401	1321	51.92
14.55	2.933	0.06443	1517	56.92
14.39	3.143	0.05609	1742	62.25
14.21	3.369	0.04883	2002	67.92
14.02	3.611	0.04251	2299	73.93
13.81	3.870	0.03701	2641	80.24
13.59	4.147	0.03222	3034	86.85
13.36	4.445	0.02805	3485	93.72

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13.11	4.763	0.02442	4003	100.8	
12.84	5.105	0.02125	4598	108.2	
12.55	5.471	0.01850	5282	115.7	
12.24	5.864	0.01611	6067	123.4	
11.90	6.284	0.01402	6970	131.3	
11.55	6.735	0.01221	8006	139.3	
11.16	7.218	0.01063	9196	147.4	
10.75	7.735	0.009252	10560	155.5	
10.31	8.290	0.008054	12130	163.8	
10.08	8.582	0.007515	13010	168.0	merging
9.828	8.926	0.007012	13940	172.3	
9.274	9.769	0.006104	16010	181.4	
8.638	10.81	0.005314	18390	190.9	
7.905	12.05	0.004626	21130	200.8	
7.060	13.52	0.004027	24270	211.2	
6.876	13.84	0.003917	24950	213.3	surface hit

FARFIELD CALCULATION (based on Brooks, 1960, see guide) Farfield dispersion based on  
wastefield width of 39.44m  
--4/3 Power Law-- -Const Eddy Diff-  
conc dilution conc dilution distance Time  
m sec hrs 0.003915 24963.4 0.003915 24962.2 220.0 221.3 0.1

**APPENDIX D--RESPONSE TO COMMENTS**

Olympic Sewer and Water, the operators of the Port Ludlow facility made comments on the draft permit and fact sheet that were factual in nature.

A letter was received by Puget Soundkeeper Alliance after the closing date of the comment period. The comments were outside the scope of rules and regulations directing NPDES discharges.



